The Badminton project: D1 Report in the Badminton project work package 4: Socio-economic and institutional incentives for discarding

The institutional basis for discard behaviour

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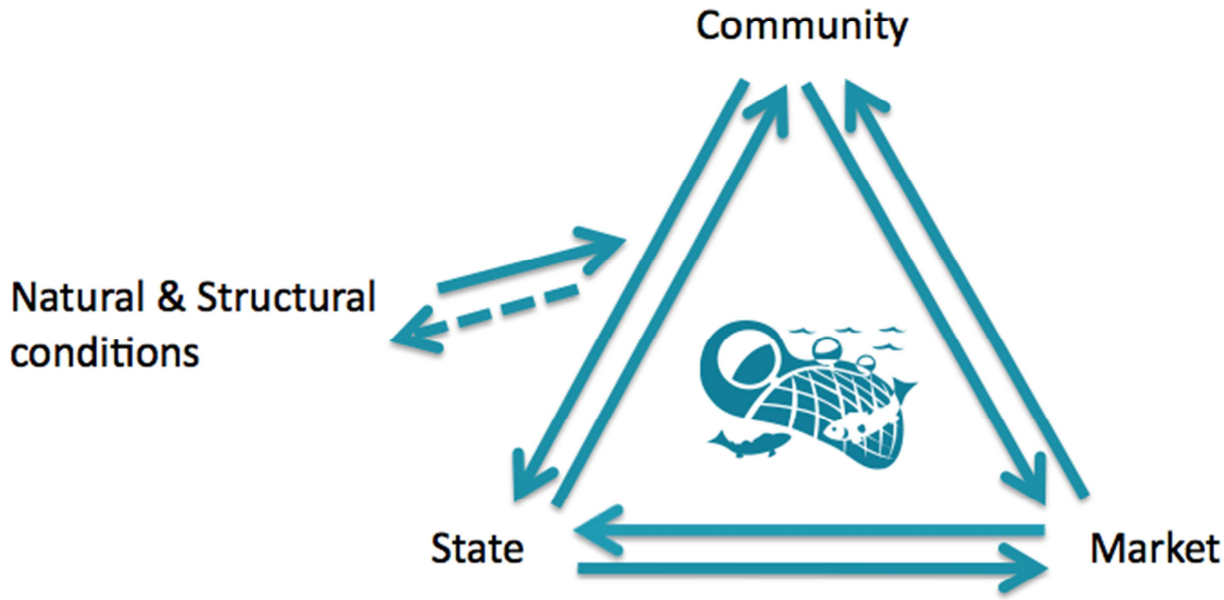

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1. Introduction: The Badminton project and WP 4

The Badminton project (Bycatch and discards: Management INdicators, Trends and locatiON) aims at developing the knowledge of discarding patterns and factors in European fisheries, evaluating the efficacy of selective devices and other discard management measures that have been implemented in the past and finally improving methods to analyse, monitor and manage bycatch and discards in European fisheries. The term bycatch is not clear defined as noted by Alvarson et. Al (1994). In line with this we see bycatch as the non-target catch, meaning the incidental catch (which are retained) and the discard. Especially the discard fraction of the bycatch can be a problem in economic and environmental terms.

One objective of the project is to provide estimates of the amounts discarded in selected European fisheries, which have been finalised by work package 1 (WP 1). WP 2 has the object to develop indicators of the total catch, discards and selectivity on the stock, community and fleet levels. WP 3 and 4 together have the objective to find the most important factors that determine the amounts of discards, including ecological, social, economic and technical factors. WP 3 will focus on environmental, technical and economic factors, mainly based on statistical data. WP 4 is supposed to focus on socio-economic and institutional factors for discards, with a central emphasis on qualitative data. The last objective of the project is to suggest integrated management approaches to the discard issue, which is addressed by WP 5. WP 4, thus, can base the work on results from the previous WPs and should provide information to the integrated management approaches proposed in last work package.

WP4 focuses on the socio-economic and institutional factors that influence the amounts of discards. The purpose is to qualify the assessments of discard amounts and to achieve a better understanding of the importance of these factors in the development of management approaches which eventually will lead to a reduction in the amounts of discards. More specifically, there will be three case studies in WP 4 - in quite different settings regarding geography, culture and management. The factors of importance for discards are identified in each case with the purpose to generate more general patterns of important factors. The general pattern will be an input to the development of integrated management approaches.

The purpose of the working paper is twofold: 1) To develop an understanding of how socio-economic and institutional incentives influence the fishers' discard behaviours and 2) to outline the methods for studying the importance and specific appearance of the incentives during the case studies of WP 4.

The first part of the paper describes the fishing process where decisions eventually leading to discards are made. The concepts of selectivity and discards will be described in this part. The second part is a theoretical basis for understanding how incentives and drivers (factors) influence the fishers' behaviours. Based on this framework, the third part discusses how the theoretic elements could be represented when studying the discards of the fisheries. This leads to a table of the factors that potentially influence and drive the amounts of discards. These factors and their importance will be tested in the case studies. The fourth and final part of the paper discusses potential sources of data; it will especially discuss the method for gathering the qualitative data in the case studies.

1. Discards in the fishing process

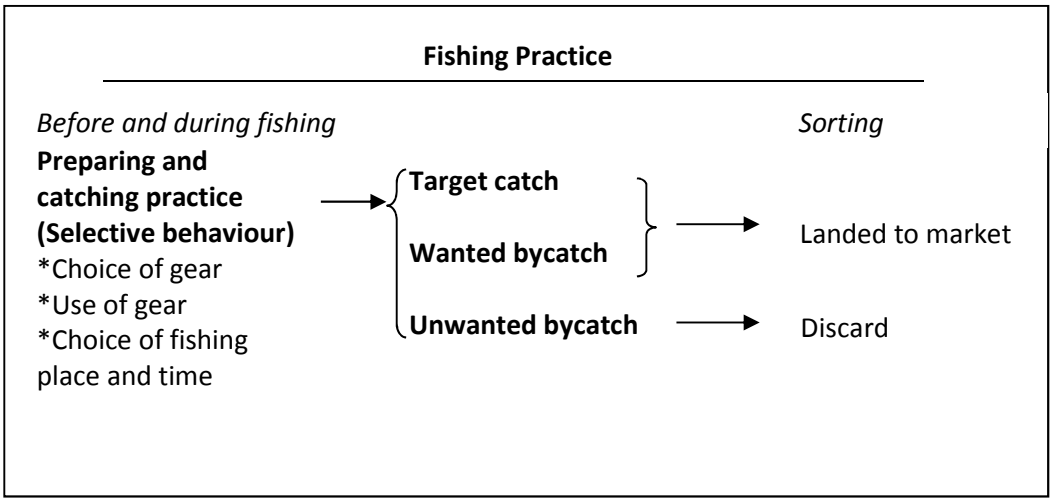
'Bycatch' and the following 'discarding' of (non-)target organisms are an integral part of global commercial fisheries. In this project, 'discards' are defined as the proportions of both target and non-target catches discharged back overboard, either 'live' or 'dead' (Rochet and Trenkel 2005). In the fishing process, the amount of non-target catch can be reduced by augmenting the selectivity in the fishing process; being more precise (selective) in the targeting of the wanted organisms.

Discards are being dealt with in different ways across management systems. Some Nordic countries have prohibited discards, though with some modification. The EU has prohibited discards of fish for quota species, which can be landed legally, whereas it is legal to discard non-commercial fish and organisms and compulsory to discard fish, which cannot be landed legally (Johnsen and Eliasen 2011). In this regard, we discuss incentives within the framework of the EU regulation meaning that discards are not just an illegal activity.

Independently of the legality of discarding organisms, understanding of the incentives to discard is important for at least two reasons. The first reason is the need of *assessing the amount of discards* for estimating the impact on species, populations and ecosystems. These assessments are important background data for the recommendations of the total allowable catch (TAC). The second reason for understanding the incentives is the wish to *reduce the discards* by reducing catch of unwanted species and individuals. Based on different reasons various groups of stakeholders express concerns about the waste of resources in discarding (from the economic waste related to discards over the waste of human nutrition to generally seeing discards as a disturbance of the natural balances). Therefore the reduction of discards is a highly profiled political goal in the EU and at broader international levels (EU Commission 2007, Kelleher 2005). Especially in the perspective of the reduction of discards selectivity is a central issue.

To understand how the various factors influences the amounts of discards, we have to identify the choices in the fishing process which can lead to discards, both the day-to-day decisions (the fishing tactics) and the strategic long-term decisions (Christensen and Raakjær 2006). The discarding takes place in the sorting process on the vessels right after the catch has been taken on board. Section 1.2 addresses these very short-term tactical decisions regarding discarding or maintaining each caught fish. Section 1.1 addresses the conditions for this, both the tactical choices which are made right up to the trip (choice of gear, fishing place and time etc.) and the strategic choices (choice of vessel, investments in quotas and equipment). They are named choices for selective behaviour; Tactical and strategic decisions that augment the selectivity and thereby unwanted catch and discards. This is illustrated in figure 1.

Figure 1: Selective behaviour and discard in the fishing practice, own model.



1.1 Selective behaviour

Selective behaviour is an activity with the purpose of reducing the amount of unwanted bycatch and thereby discards. The selective behaviour is an activity in the preparation of the fishery and the fishing process until the catch. This includes the long-term strategic choice of investment in the vessel etc., as well as shorter time tactical choices regarding the gear and the use of it and the choice of fishing time and place (Eliasen et al. 2008).

The strategic choices included in the selective behaviour regard the long-term investments. The main investment regards the vessel, the type of vessel and the configuration e.g. the types of gear and processes it can handle. In regions where quotas can be traded, investments in quotas can be seen as a long-term investment in buying quotas for future use. Depending of the market structure, buying or selling quotas can also be part of the tactical behaviour to adjust the quota mix to actual catch.

The choice of gear is a very important part of the selective behaviour regarding both choice of type of gear (trawl, net, longline etc.) and the configuration of this (mesh size, grids, pingers, hook size etc.). First of all, the choice of gear and configuration is conclusive for the attraction selectivity. This means the ability to attract the wanted species and sizes, or discourage the unwanted species and sizes. This could be by using pots for Nephrops, which have no or very little catch of bottom fish or by using pingers to scare away mammals in nets. The choice of specific gear will exclude the possibility (or the probability) of catching a number of non-target species, which could lead to discards. The gear's contact selectivity relates to the fish, which are forced to get in contact with the gear. Some of these are caught and other individuals are allowed to escape the gear, depending on species and sizes. As an example contact selectivity in the trawl fishery is related to form and size of the trawl and meshes as well as eventual escape windows and grids (Catchpole and Revil 2008). But the use of gear also affects the contact selectivity; e.g. the effective mesh size of a trawl may change depending on the speed of the vessel, which is why the diamond mesh (less dependent of the strength of the pull to size) has been implemented.

The fisher's choice of fishing time and place is another factor, which influences the selectivity. In a dynamic environment as the sea, there are no simple ways to find the places (and periods) where the fishery can take place with no or very little catch of unwanted individuals. Where to find the wanted fish and the

specific composition of species and sizes differs over time. Though, over time the skipper gathers information about good (or bad) fishing places, often combined with information about other factors such as time of the year, previous and present weather conditions, even the level of daylight (sunshine/clouded) (Catchpole 2005). This is central knowledge for the experienced skipper, which is used for optimising the landings, but eventually it can also be used for avoiding unwanted catch if this element is recorded by the skipper. The time and place factor are reflected in management as closed areas on a permanent basis (marine protected areas), in certain periods of the year (e.g. in spawning periods) or temporarily closed areas based on fishers information about e.g. many young fish in a certain area, as seen in the Scottish fisheries (Scottish Government).

Depending of the fisher's/skipper's ability to be selective in the strategic as well as the tactical choices, the specific catch will have more or less unwanted catch to be discarded after the catch is landed on the deck.

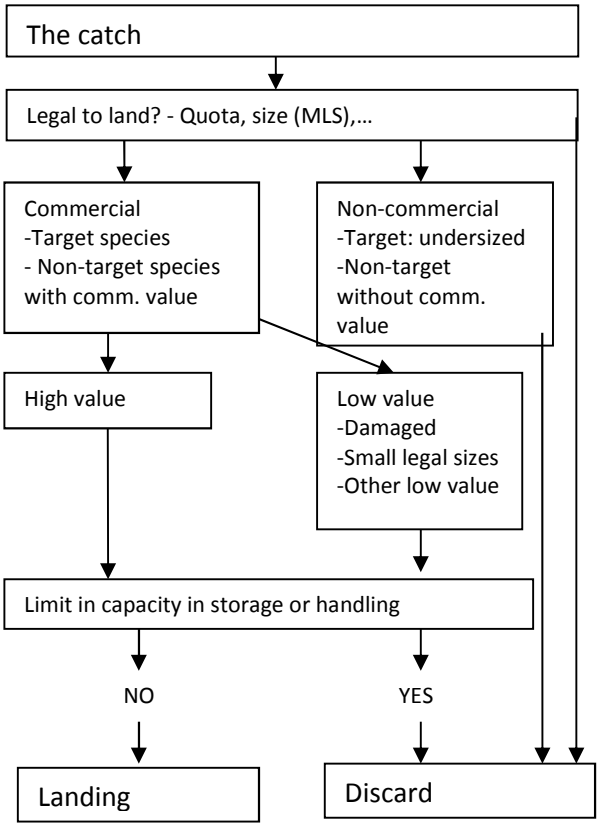
1.2 Discards on the deck

When the fishers have brought the whole catch aboard, it consists of the targeted individuals as well as other individuals, which the fisher might or might not want to maintain and land. In practice the decision of discarding or maintaining the fish often will be made within in a few seconds. But for analytical reasons, it can be seen as a series of decisions from the fish in the net to the final storage and landing, as illustrated in figure 2 below (Pascoe 1997 in Eliasen et. al 2008). The right part of the figure labels the types of factors influencing the decisions (bearing in mind some types of discards are legal or even compulsory according to the EU regulations).

After the catch has reached the deck, the fisher will make decisions regarding discarding or maintaining and landing the fish based on various considerations, as described by Andersen (et al 2005) and Rochet and Trenkel (2005).

- Is it legal to keep the fish according to the (EU) regulation? The legality of keeping the fish depends of the specific regulation of the fishery. Various factors can influence; minimum landing sizes (MLS), general conservation rules, quota rights for the vessel, the species mix in the haul etc.
- Are there any commercial values of the fish? The commercially interesting individuals could be the targeted species in correct size or non-target species with commercial value. The non-commercial fish would be undersized individuals of the targeted species or species without commercial value. The non-commercial fish would normally be discarded.
- A part of this decision regards the perceived value of the fish. High value fish will be kept, while some marketable but low value fish could be discarded in order to focus on the high value fish. The low value fish could be damaged fish, the lowest paid legally landed sizes (high grading) or other low priced species.
- Finally, there could be physical limitations on what can be kept and landed. Limits in capacity and skills to handle the catch and capacity of storage can also lead to the discarding of the fish. The limits could be time and manpower to process and ice the catch within reasonable time or that the handling facilities are either too little storage space or absence of special treating facilities to specific species. In these cases it might be easier to discard this part from the beginning, although it could have been marketable. In this final step of decisions skills and technology for handling and storage are factors influencing the decisions.

Figure 2: Diagram of the principal decisions in the sorting process leading to discard or landing in a system with legal/compulsory discards (based on Eliasen et. al 2008 P 38/ Pascoe 1997).



Factors in decision in sorting

Regulation

Market

Market/perceived valuation

Technology (storage)
Skills (handling)

The discards depend on the degree of unwanted catch (the selectivity in planning and carrying out the fishing process) as well as the interrelation between regulations, markets, technology (gear and vessel characteristics) and the skills of the fishers (in the handling). Further one should be aware that the decisions are taken through a filter of the fishers perception of regulation, market signals etc. which differs between individuals as well as the situation. As an example Catchpole, Frida and Gray (2005) mentions that the Scottish fishers tend to retain whiting down to 27 (the MLS) if this is the target species, while only whitings down to 30 to 35 cm is retained if the target species is haddock or cod with larger MLS. The perception of the MLS of the specific species seems to depend of the MLS of the species caught in the same haul.

2. Understanding behaviour in an institutional framework

In the previous part, focus has been on the factors influencing the selectivity and discards and the fishers' reactions on these in the form of choices in the planning of the fisheries and choices of maintaining or discarding parts of the catch. But how do the identified factors, and the incentives they represent influence the fishers' behaviours eventually resulting in discards?

The institutional theory offers tools for understanding how various incentives and institutions influence the individual behaviour. As Rudd (2004, P 112 ff) emphasises the individual behaviour is influenced by *perceived* incentives of various capitals; natural, manufactured (technology), human (knowledge) and social

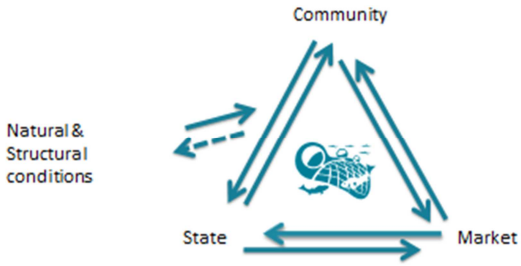
capital. The latter, the social capital, is institutionalised as rules-in-use, e.g. formal rules and regulations as well as informal rules as norms and values for specific groups.

These capitals are anchored in three settings; Community, State and Market characterised by different institutional orders (Apostle et al 1998). As ideal types the community is the lived-in human community based on interpersonal ties and egalitarian social networks governed by norms and values and social identification (Scott 1995). The State is based on formal institutions and structures of law, policy and governance, with specific regulations and decision-making procedures (technical and regulative measures), communication structures and formal control and enforcement systems. Finally the Market is characterised by competition, economic efficiency and (economic) rationality. In real world the three settings interacts and consist of different compositions of institutional orders ideally addressed to the other settings, as an example the market is an institution with own norms and rules to be followed in order to function (Scott 1995).

Apostle et al. (1998) argues that the fisheries develop in the triangle of Community, State and Market. Likewise we will argue that the behaviour of the individual should be understood as a result of factors from these three settings.

Johnsen and Eliasen (2011) argue, in line with the previous, that an institutional approach should be taken to a complex problem as that of discards. They claim that to understand the conditions for fisheries management, the natural/ecological conditions should be included as an important element. The natural conditions are very dynamic, but external to the individual fisher as well as the institutional orders (State, Capital and Market), although these in the medium and long term can influence the natural conditions. In same way are the structural conditions, mainly in form of fixed capital invested in the vessels of the fleet, regarded as a given condition in the short run action (Christensen & Raakjær 2006). But in the long run the structural conditions are clearly determined by state, community and market.

Figure 3: The model of the institutional embedded fishing practice. Fishing practise embedded in the Community, State, Market interrelation and the natural conditions.



The model of the fishing practice in the institutional framework intents to grasp the institutional analysis at the operational level. The operational level is where the tactical decisions in the day-to-day operations are performed. The case studies on the analysis of incentives for discards will mainly focus on this level.

3. The appearance of the institutional settings in relation to discards and selectivity

The model of the institutional embedded fishing practice should be further specified to be useful as a tool for analysing the factors possibly influencing the behaviour leading to the discards or selectivity. In the following we will specify the factors to be surveyed as possible factors in the selective/discard behaviour in the case studies.

3.1 Natural and structural conditions influence at the fishing practice and discard

The natural or the ecological conditions in the sea and the targeted fishery is important for selectivity and discard. There is generally a much lower discard level in fisheries targeting fish in schools than in fisheries targeting species in a mixed environment in regard species, size and year classes. Also the stock behaviour; natural variations in abundance, changes in position etc. influences unwanted catch and discard. Other natural conditions can influence; sea bed conditions (e.g. limits the use of gear types) or general weather conditions (e.g. waves can influence the functionality of the gear and the possibility of sorting and handling the fish aboard).

Large sums of financial capital are fixed in investments in vessels, equipment and training in fishing in a certain way. In a short time perspective the fleet structure is therefor hard to change radically and can be regarded as a condition for the individual fisher and therefore a fixed condition for behaviour.

3.2 Community influence at the fishing practice and discard

The community is the first setting for institutional factors influencing fishing practice and discard. As such the community is the social setting which influences the fishing practice. In most situations this could more or less be seen as the norms and values of the lived-in community for the fisher as the fisheries generally is still located in more or less fishery dependent or dominated communities. In some situations though "the community" could be a subset of the lived-in community where fisheries are dominant or even a less geographic, more social defined community of a certain type of fishers, if this community – rather than the physical/geographical community - defines the values and norms in use in the fishery.

As such the community are mainly the domain of values and norms, but also cognitive elements as categories, typifications and meanings. The norms and values are maintained by conformity, which creates relatively stable cultural elements and sets conditions for- and limits the individual choices and actions. The individual feels a belonging to one (or more) social groups. The group are constituted by a set of *norms, values, morals and ethical standards,* which the individual tends to follow to avoid social sanctions. The social sanctions may vary from remarks on improper behaviour from friends to the exclusion of the individual who does not follow the dominant norms in the group.

The norms and values are generally historically based and slowly adjusted to fit the surroundings. In this way the norms represent past experiences in the group. These experiences are deducted from the specific situations and "sunken" to be the norm or "the way it is done". In that way the sum of experiences is

generalised as knowledge within the group about how to do, it is *institutionalised knowledge.* Without being contrasted with other ways to do it, the norm is often tacit for those practising it. Nevertheless, in the cases studies there should be an establishment of the basic understanding of the norms and institutionalised knowledge related to the discard behaviours among the fishers, as this could influence the actual choices (as seen in Nielsen and Mathiesen 2003).

While norms are generally sunken, categories, typifications and meanings are negotiated among the participants in an on-going and more reflected and cognitive process. In relation to the discards and (changed) selective behaviour, learning and redefinitions of the fishers' roles and identities are central.

The *identity* as fisher and especially the role in relation to the management system and extraction of nature influences the behaviour – the two extremes could be in the one end the fisher as the free extractor of the sea resources, delimited by the management and enforcement system, and in the other the fisher as an actor in a larger system with the aim of establishing an environmental and economic sustainable resource exploitation. As the role is under debate in many relations, one should be aware of the possibility of differences between the declared role and the performed role. Therefore in the study, the expressed roles should be registered as well as the role in practice.

The fisher's role in relation to the management system and the discard avoidance can be seen in practice in various ways e.g. in participation in *dialogues* with management, individual registration of discards in order to learn how to reduce these, collective *learning* and experience exchange with the purpose of reducing discards etc.

3.3 The State and regulation influence at the fishing practice and discard

The setting of the state is the domain of rules and laws. In this regard the overall policy framework is the Common Fisheries Policy. It sets the objectives of the policy, the regulations and specific technical measures as well as the rules for how these are decided and communicated.

The regulations and technical measures limit the conditions for the individual fisher's actions (the fishing activity). For the study of the cases it is important to understand the regulative conditions for the individual fisher/the group; who are allowed to fish (and eventually how the rights can be transferred), how are the limitations in the fishing activity implemented (the specific input and/or output regulation) and the supporting technical measures; specification of gear for the individual fishery, eventually permanent or temporary closing of areas, discard rules (prohibited/compulsory) etc.

The *decision making procedures* regulate the fishers' influences on the regulative outcome and the legitimacy of the regulations. This is highly important for the legitimacy of the regulations among the fishers, and probably also for the specific design of regulations and technical measures. Thus, in the case studies the formal procedures regarding the decision and design of the tool should be surveyed, as well as the fishers' perception of the process.

In this regard the specific *communication structures* between the fishers and the managers are important. These structures can carry information both ways; dialogues between fishers and management for designing useful technical measures as well as for communicating regulations for augmenting the

implementation. The communication structures are the formal and the informal forums where fishers and managers can meet and discuss experiences of discarding, effects of selective gear and measures etc. – advisory boards as well as dialogues during control sessions. The structures should be seen in a broad sense including the way the communication takes place; is it an open dialogue where problems and considerations can be exchanged or are a marking of positions and interests.

Finally an important part is the *control and enforcement* procedures and implementations. Control and enforcement is the tool for securing regulations to be carried out. For most fishers this is the main interface to the regulative system. The efficiency of the enforcement of regulations influences the fishers' incentives to follow the regulations, in this regard regulations influencing discards.

3.4 Market influence at the fishing practice and discard

The market can be seen as social structures (Scott 1995, p. 51), characterised by competition, economic efficiency and economic rationality. Within this setting, the *economic incentives* are important factors for fishing as an economic activity. For the individual fisher the markets and the conditions (what can be sold and which prices) are given (though often fluctuating) conditions within a short-time period. The existence (or absence) of a market is a main driver for the choice of fishing activity at all and therefore also important for choice of discards (Catchpole et al 2012). Also the patterns at the market reflecting prices for certain sizes, visible qualities (freshness, eventual marks etc.) as well as intangible qualities (sustainability of the fishing and processing, catch area etc.) might influence the discard choice.

The *available gear and vessel* are a material and economic condition for the individual fisher and his tactical choices. The fisher is to a certain degree locked into a certain fishery due to his earlier strategic decisions regarding investments in the vessel and to a certain degree the gear (Christensen & Raakjær 2006). Radical shifts in the fishing methods (e.g. from trawl to net) can imply huge investments for rebuilding the vessel, which can be a barrier to quick changes in the fishing methods. Besides investments in the technology such shift also implies investment of time and capital in learning to *use* the new technology, which is often a long time consuming process, and possibly also social and economic transaction costs in redefinition of the type of fisher. Therefore the available vessel can be seen as a given condition for the fisher's short-term tactical decisions. The existing equipment and gear also represent fixed capital, but in a minor scale. Therefore this can be seen as a field for action rather than a condition for action.

The concrete factors of the institutional settings (and natural conditions), which might function as drivers for the discards/selective behaviour are *listed in figure 4 below*. These factors should be reflected in the case studies to ensure that possible important driving factors are not excluded.

Figure 4: Specified list of factors which might function as drivers for the discards and selective behaviours.

Natural conditions	Natural conditions - Stock - Other natural conditions	Mixed/single species fishery Natural changes in stock availability Physical conditions Weather conditions
	Structural conditions – fleet structure	Fixed investments in vessels (and partly equipment)
Community	Dominant norms regarding discards	General view of discard Institutional knowledge regarding volumes, consequences etc. of the discard Social norm enforcement
	Identity	The fishers' perceived role in relation to the management system
	Learning	The fishers´ interpretation of the management system and dialogues with the management regarding the discards Individual and collective initiatives to learn
State	Regulations and measurements	Input/output regulation Technical measures, including spatial-temporal closures
	Decision rules and procedures	Legitimacy of the fisheries regulation
	Communication structures	Formal and informal forums Communication "climate" - dialogue/position marking
	Control and enforcement	Interpretation of strength of control and enforcement Level of registered non-compliance
Market	Economic incentives	Market prices Market pressure for certain "qualities"
	Tactical and Strategic investments in technology	Fishing gear/equipment for tracing, handling and storing

4. The data collection for the case studies – and the interview guide

Each case has to be described to draw a picture of the fishing and thereby also the discard practice and selective behaviour. The factors developed in the model (the list in figure 4) should be examined in order to see if they function as a driver in regards to the discard and in such case how important this factor is.

Some of the factors can be mapped based on existing data available in desk study: the scientific knowledge about the natural condition for the specific fishery (the mix of species and sizes and areas of appearance), the regulation of the fishery (the general mechanisms and specific measures for reducing the discards as gear specifications, closed areas etc.), and the general market conditions of the fishery. Further, the composition of the fleet and general use of the gear and fishing places can be registered to some extent. Besides the framework conditions, the desk research can further document (parts of) the behavioural outcome such as compliance (through registered violation of regulations) and registered discards (from observations and test fisheries) as well as information on local history, organisations etc. which contributes to the understanding of norms and cognitive institutions among the fishers.

Mapping data on these factors can point at some of the important drivers. But more qualitative methods should be used to understand the influence by most of the community factors as well as the perception of the state and market factors. In this regard we propose the use of semi-structured personal interviews. The interviews should describe the everyday life of the fisher, in which discards are a part. Through this description (and understanding) of the everyday practices an understanding of the elements of the factors can be illuminated. These elements are often more intangible and tacit, but can be interpreted from the everyday description and to some degree through observations of behaviour; attributes etc. during the interview visit (Schein 2004).

4.1 Qualitative interviews

We would like to obtain an understanding of the discards from the fishers' perspective. This entails getting to know the fishers, their fisheries and their everyday challenges and appreciations. Hence, we prepare to conduct a number of semi-structured interviews. Semi-structured interviews are conducted in a way that balances on one hand openness to the informant's associations/answers and on the other hand an agenda for the overall topics of the interview. Methodologically, the guide for the interview can be based on Bernard's ideas for semi-structured interviews (Bernard 1995) and Kvale's writings on dynamic, positive interaction (Kvale 2004).

Semi-structured interviews are based on tight-rope walking between on one hand openness to the informant's associations from the questions – the informant can, through his answers; influence the directions of the interview. On the other hand, during the interview the interviewer has to ensure that the overall objectives and focuses of the interview guide are covered. Discards can be a sensitive topic for the fishers to discuss. In order to get the fishers to tell about their discards in detail, slow progress is needed. Ideally fishers should be revisited for interviews in order to obtain valid knowledge on discards, yet this is for practical reasons not an option. Hence we aim at positive and dynamic interaction instead. Positive and dynamic interaction, according to Kvale, is about translating the research questions into everyday questions in order to promote the informants' motivations to tell about the topics behind the research questions instead of the just answering them shortly.

Each interview is followed by an evaluation, e.g. considering the questions: 1) Which new information (concepts, reasoning etc.) did the interview provide? 2) Does any of this information open new perspectives in the answering of the overall research question? 3) How can the information be tested/broadened in later interviews? and 4) How does the new information fit into the information from previous interviews? In case this evaluation exposes gaps in the interviews or poses new unasked questions, the informants are contacted for further information.

Qualitative research does not aim at being representative in a statistical sense (Kvale 2004; Wadel 1991; Spradley 1980). This does, however, not mean that any combination of informants would make a good sample to explore from. The interviewed informants have to be strategically chosen from relevant background variables such as: age, seniority in fisheries, number of days at sea per year, size of vessel, type of gear and participation in fisheries politics.

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